REMARKS

Reconsideration of the rejection of the subject matter of this application is requested.

The claims have been amended to overcome the rejection based on 35 U.S.C. 112, and to correct typographical errors (claims 15 and 16). For reasons detailed below, applicants earnestly believe that the claims as they now stand adequately distinguish from the prior art cited. New claim 18 has been added.

The drawing

The drawing on file appears to be acceptable.

Status of claims

Claims 1-17, originally presented, and new claim18, remain for consideration on their merits.

Summary of invention

Prior to addressing the rejections of record, the most salient features of applicants' invention will be reviewed. The invention is directed to an improved MARS device structure in which charge build up on the movable membrane, and stresses that cause curling of the membrane, are reduced through the replacement of the conventional silicon nitride membrane material with single crystal silicon. All of the pending claims include this feature. In prior art movable membrane devices, the membrane comprises a layer of nitride, oxide or other

insulating material. In the so-called double poly membrane structure, a membrane successfully used in many movable membrane devices, the insulating layer is sandwiched between two polysilicon semiconductive layers. This will be recognized as a classic capacitor structure. That is one reason why unwanted charge builds up on the membrane. In the membrane of the invention, a single crystal silicon membrane, the conductivity of the membrane is sufficient to allow charge to dissipate from the membrane. No prior art is known to applicants wherein a single crystal of silicon is used as the movable membrane in a MARS type device.

Issues

Rejections

Claims 5 and 10-12 stand rejected under 35 U.S.C. 112. Applicants' attorney thanks the Examiner for pointing out the defects in these claims. They have been suitably amended.

Turning to the rejection based on prior art, the following rejection is acknowledged and intended to be responded to in these remarks.

Claims 1-20 stand rejected under 35 U.S.C. 102 (b) as anticipated by the patent to Goossen et al.

Arguments

Applicants can find no reference in the Goossen patent to single crystal silicon. That being an important feature in each of applicants' claims, the rejection under 35 U.S.C. 102 does not appear to have merit.

The Goossen patent, as well as many other patents relating to the subject matter of the invention, describes the use of polysilicon as an electrode material in conjunction with the active optical material that forms the movable membrane. The Examiner is aware that polysilicon is not single crystal silicon. See for example http://en.wikipedia.org/wiki/Polycrystalline_silicon

http://www.stanford.edu/~adm11/research/boulder00.pdf

both of which refer to: polycrystalline silicon (polysilicon).

See also US Patents 6,529,282 line 39 col 1, 6,337,760 line 26 col. 7 both of which appear to have been examined in the group handling this examination. Also, Examiner Lester has examined applications resulting in these patents:

6,233,088

6,215,579

6,172,792

6,137,623

6,108,121

5,978,127

5,170,283

Each of these patents refers to polysilicon, and several relate to technologies similar to that of the present application. Accordingly, it is concluded that the Examiner is aware of the technological differences between single crystal silicon and polysilicon.

One of these differences is that single crystal silicon is very expensive compared to polysilicon. Polysilicon can be, and nearly always is, produced by

depositing the material from a vapor phase reaction. That is an inexpensive and simple operation in device processing. Thus polysilicon is widely used as an electrode material in electronic devices. It is used as the gate material in literally billions of silicon gate MOS transistor devices. It is also the electrode material of choice in movable membrane devices, such as MARS devices. However, in applicants' device, using single crystal silicon as the membrane material, there is no need for electrodes. See p. 7, line 21 et seq. The use of electrodes in addition to the single crystal silicon membrane is an optional choice. While these electrodes, if used, may be polysilicon, in every embodiment of the invention there will be at least one layer of single crystal silicon.

Although the rejection under 35 U.S.C. 102 is believed to be without merit, the applicability of the reference under 35 U.S.C. 103 will be discussed.

As has been pointed out above, single crystal silicon is an expensive material. Also it is a semiconductor, not an insulator. The replacement of the conventional insulating membrane materials with single crystal silicon is believed to be eminently non-obvious. The significant difference in physical properties between silicon nitride and single crystal polysilicon make use of the latter not obvious. Moreover, the substitution of a material with much higher cost is not obvious. Finally, the functional advantages of using single crystal silicon as the membrane material are not obvious. As stated earlier these include reducing unwanted charge build-up on the membrane, and eliminating the need for electrodes associated with the membrane. New claim 18 emphasizes this feature.

In view of these arguments, it is submitted that claims 1-18 distinguish in a

patentable and non-obvious way from the reference and allowance therefore is requested.

In the event that the Examiner concludes that a telephone call would advance the prosecution of this application, the Examiner is invited and encouraged to call the undersigned attorney at Area Code 757-258-9018.

Respectfully,

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